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WORLDWIDE AFFAIRS

PAPER CALLS FOR 'OVERALL CLEANING' OF EUROPEAN ENVIRONMENT

LD300918Y Moscow TASS in English 0823 GMT 30 Sep 78 LD

["SOVETSKAYA ROSSIYA: Western Countries Should Have Their Say"--TASS headline]

[Text] Moscow, September 30, TASS--The problem of environmental protection is more clearly assuming an international aspect in Europe as, perhaps, nowhere else. The ecological situation in the continent can be radically improved only on the basis of the all-out concord of socialist and capitalist countries, SOVETSKAYA ROSSIYA stressed.

A little less than three years ago, the newspaper recalls, Leonid Brezhnev expressed the idea that all-European congresses be held with a view to study and outline ways of cooperation in three spheres: environmental protection, transport and energy. In the opinion of Soviet specialists, at the environmental protection congress it would be expedient to discuss questions of long-distance transnational transfer of contaminating substances in the air and water media, development of waste-free and or little-waste technological processes, the use in plant-growing of chemical fertilisers and toxic chemicals, which affect, specifically, the condition of inland water reservoirs and ground waters. A program of joint actions in protection of the sea medium can be a subject of consideration. It is proposed to form an all-European system of stations that would keep an eye over the changes taking place in the atmosphere under the impact of transnational contaminations, and also to elaborate a single appropriate measuring equipment and, possibly, the common criteria of appraising the condition of the environment.

"It is not difficult to see that all these proposals meet the vital needs of the European countries and create a vast sphere of joint activities, that would also favourably affect the development of political relations between them," the newspaper points out. But inside the Common Market there are influential forces that should like to make prospects of advantageous cooperation dependent on "tractability" of socialist states in the sphere of the notorious "human rights, "freedom of information" and the like. And since it has long been clear to everybody that the countries of socialism cannot be forced to trade in principles, there involuntarily comes the unambiguous conclusion: The proponents of such a course are, in all appearance, against the all-European cooperation in general.

"The Western countries should have their say," the newspaper SOVETSKAYA ROSSIYA stresses. "Exactly in Western countries decisions should be taken which will make it possible, at long last, to start 'an over-all cleaning' of the European Continent".

WORLDWIDE AFFAIRS

U.S. OIL MONOPOLIES CONTINUE TO POLLUTE SOUTH KOREA

SK071558Y Pyongyang KCNA in English 1500 GMT 7 Oct 78 SK

[Text] Pyongyang, 7 Oct (KCNA)--The Pak Chong-hui puppet clique again defended the colonial exploitation by the U.S. oil monopolies which squeeze fabulous profits every year without devices for preventing pollution, according to a report from Seoul. Recently, they allowed the refineries of the U.S. oil monopolies operating in South Korea to postpone the installing of anti-pollution devices till 1985.

Reports say that the U.S. oil monopolies, backed by the puppets, ship into South Korea oil of low quality containing a high percentage of sulphur and cause serious pollution while processing it. Nevertheless, the puppet clique do everything possible to guarantee maximum profits to their imperialist masters, turning a deaf ear to the demand of the people and public circles to prevent pollution.

This is their treacherous act of prolonging their dirty life under the aegis of the foreign monopoly capital by leaving South Korea a dumping ground of its pollution materials.

CSO: 5000

INTER-ASIAN AFFAIRS

'NODONG SINMUN' SIGNED COMMENTARY ON ROK ENVIRONMENTAL MOVES

SK071710Y Pyongyang KCNA in English 1534 GMT 7 Oct 78 SK

[Text] Pyongyang, 7 Oct (KCNA)--NODONG SINMUN in a signed commentary today denounced the buffoonery of "proclamation of a charter on nature conservation" by the Pak Chong-hui puppet clique on October 5. Branding this as a deceptive act that can be committed only by such brazen-faced wretches as the Pak Chong-hui puppet clique, the commentary asked: have the South Korean puppets ever had an intention to protect nature?

It says: The Pak Chong-hui clique have covered the whole of the Korea with a suffocating powder-smoke by staging frantic exercises and destroyed and devastated mountains and rivers. In order to feather their own nest, they have introduced indiscreetly polluttional industries rejected in foreign countries as "dust bins," thus spoiling the land, and denuded mountains of trees through random felling.

The people are suffering from the air polluted with various harmful materials, poisonous materials flow into paddy and non-paddy fields to kill crops and fishes are being exterminated in the polluted rivers and seas.

Having reduced South Korea to such a state, the Pak Chong-hui puppet clique have the effrontery to talk about "nature conservation." The puppets' outcry for "nature conservation" is intended to veil the consequences of their treacherous crimes and mislead public opinion and attain a foul political aim in this shameless row. In other words, it is aimed at lulling ever-growing discontent of the people and holding the "election" to the puppet national assembly without a hitch (?or) swindles.

It is not fortuitous that these days the puppets never open their mouths without bragging of their "feats" and making empty "promises" and kick up a hypocritical row every day to create the impression that they are concerned for the people's living. Only by removing such a gang of vicious traitors as the Pak Chong-hui puppet clique can the South Korean people live a free life, breathing clean air under a clear sky.

CSO: 5000

INTER-ASIAN AFFAIRS

PRC ENVIRONMENTAL PROTECTION GROUP BEGINS 25-DAY TOUR OF JAPAN

OW300645Y Tokyo KYODO in English 0626 GMT 30 Sep 78 OW

[Text] Tokyo, 30 Sep (KYODO)--A Chinese environmental protection mission arrived here by air Saturday afternoon for a 25-day visit to study Japan's experience in environmental protection and pollution prevention. The 18-member mission, whose visit is a sequel to one in June 1975, was led by Li Chao-po, the general office director of the environmental protection leading group. It also included executives in such fields as metallurgy, oil industry and water-powered generation. The mission will visit the environmental agency, the National Institute for the Study of Pollution and tour the Kansai, Kanto and Tokai areas to inspect oil refineries, iron mills, automobile factories and steam-powered generation stations.

CSO: 5000

FRENCH POLYNESIA

FIFTEEN TAHITIANS UNDERGO R-TREATMENT

Seoul THE KOREA TIMES in English 22 Oct 78 p 3

[Text] Suva, Fiji (AP)--Fifteen Tahitians have been secretly isolated in a hospital at Mururoa Atoll for treatment of radiation sickness, visiting Tahitian politician Oscar Temaru said here Friday.

Some French civilians were also affected by radioactivity from French nuclear tests in the area, he claimed.

Temaru, 34, is a customs official, who is also president of Front de Liberation de Lay Polynesie, one of four political parties, he said, agitating for Tahiti's total independence from France.

Temaru said a friend had seen radiation sickness cases in a hospital at Mururoa where France has its Pacific nuclear test headquarters.

"We have 15 local people in Mururoa hospital and some French also. They (French authorities) are keeping it secret. We found this out a month ago and my friend says it might be from eating fish," he added.

Temaru said patients were reported to have burns and to have a yellow appearance.

He said he wrote to Francis Sanford, vice president of Tahiti's assembly, asking for information about the cases.

"I have not had a reply. I have not bothered to ask the French administration because they would not admit it," he said.

Temaru added that people from islands of Reao, Fangataufa, Tureaia and Mangareva, are forced to travel to Tahiti to buy fish because authorities had ordered them not to eat fish from their own lagoons.

CSO: 5000

PEOPLE'S REPUBLIC OF CHINA

BRIEFS

KWANGTUNG ENVIRONMENTAL SCHOOL--To promote environmental protection work, an environmental protection technical school will soon be established in Canton. This school will enroll 300 students who will study for 3 years. The school site is at the provincial environmental protection research institute. [Canton Kwangtung Provincial Service in Mandarin 0430 GMT 14 Oct 78 HK]

CSO: 5000

SOUTH KOREA

PRESIDENT PAK URGES PROTECTION OF ENVIRONMENT

SK050251 Seoul HAPTONG in English 0248 GMT 5 Oct 78 SK

[Text] Seoul, 5 Oct (HAPTONG)--President Pak Chong-hui today called on the people to positively participate in the on-going national campaign for nature preservation.

In his speech at a ceremony for the proclamation of a nature preservation charter, President Pak said that nature is not only the very source of human life but also the foundation of precious resources. The nature preservation campaign is a voluntary drive aimed at improving the living environment, the chief executive said. Warning of the danger of industrial pollution to the living environment, President Pak said that the very existence of human being will be threatened unless something is done to check the worsening pollution.

The ceremony held at the Sejong Cultural Center here was attended by government leaders and some 4,000 citizens.

CSO: 5000

THREE-MONTH DROUGHT CAUSES SEVERE WATER SHORTAGE

Seoul THE KOREA TIMES in English 26 Oct 78 p 8

[Text]

A spell of dry weather, which has been prolonged for some three months, is causing a serious water shortage across the country, reports said yesterday.

In Pusan, the largest port

city in the country, the amount of water in reservoirs for piped water has been considerably decreased and the water supply for the citizens has been restricted beginning yesterday.

According to the reports, the amount of reserved water in Hoidong Reservoir, on which 56 per cent of the citizens depend for their drinking water, has been reduced by some 50 per cent and the limited water supply was inevitable to cope with further drought.

Meanwhile, residents on Wan-do, an island off the coast Cholla Namdo, are also suffering from potable water shortage because of insufficient rainfalls, a report said.

Potable Water

The islanders have been rationed with a pail of water per person daily since Oct. 16. Provincial government officials in Kwangju have already asked the Navy for the equipment needed to dig wells in the drought-affected areas. The Navy has also been asked to provide vessels needed to supply potable water to the islanders, reports said.

Drought conditions developed on these islands since late last July and the precipitation on the province's coastal area has been only 750mm since the beginning of this year, they said.

In other areas such as

Chungchong Namdo, Chungchong Pukto and Cholla Pukto, the prolonged dry spell causes much difficulty in barley farming because of the rain shortage, the reports added.

KRYPTON-85 AIR POLLUTION MEASUREMENTS, RESULTS DESCRIBED

Warsaw NUKLEONIKA in English No 8, Aug 78 pp 843-849

[Article by Tadeusz Wardaszko, Julia Nidecka]

[Text] Concentrations of ^{85}Kr in atmospheric air in Warsaw have been measured applying cryogenic adsorption on molecular sieve 5A, cascade desorption and radioactivity measurements of concentrates using liquid scintillation counter. The detection limit is 0.08 Bq/m^3 (2.2 pCi/m^3). The annual mean ^{85}Kr concentrations increased from 0.63 Bq/m^3 (17.0 pCi/m^3) in 1975 to 0.93 Bq/m^3 (25.1 pCi/m^3) in 1977. Detailed temporal changes of concentrations of this radionuclide are presented. Radiation dose received by population from this source in 1977 (skin dose) was $2.6 \cdot 10^{-7} \text{ Sv/yr}$ ($26 \text{ } \mu\text{rem/yr}$) per person.

1. Introduction

^{85}Kr is one of the most significant radioactive waste products associated with fission-based power generation; it is released in considerable quantities into the atmosphere from nuclear fuel reprocessing plants, thus forming wide-spread atmospheric air contamination. There is also some contribution from nuclear explosions, however, an assessment by Telegadas [1] indicates that out of the ^{85}Kr world inventory of 1.96 EBq (53 MCi) in 1973 less than 2 per cent could be attributed to nuclear weapons tests conducted up to that time.

The concentrations of ^{85}Kr in the atmospheric air have been measured by many investigators beginning with Delibrias [2] who found a value of about 70 mBq/m^3 (2 pCi/m^3) in France as early as in 1958. From then on, constant growth of ^{85}Kr concentrations in air was noted both in Europe [3-9] and in the United States [10-12]. The occurrence of this radionuclide in the atmosphere gives rise to population doses which are primarily beta-radiation doses to the skin. At the time being they are not significant as compared to those due to natural radiation background, but, in view of steady growth of concentrations, may attain not negligible values in foreseeable future; projections by Bernhard *et al.* [12] give the ^{85}Kr mean concentration value of 70 Bq/m^3 (1900 pCi/m^3) in the year 2000, whereas its mean present level is about 0.75 Bq/m^3 (20 pCi).

The presence of higher concentrations of this ionizing component may also influence electrostatic properties of the atmosphere by enhancing its conductivity; this might cause changes in the Earth's weather conditions [13].

2. Measurement Method

The ^{85}Kr measurement method adopted in this study consists in adsorption of Kr — along with some other gases — from atmospheric air on molecular sieve 5A at liquid nitrogen (LN) temperature, desorption and concentration of the desorbate and radioactivity measurement using liquid scintillation counting.

The adsorption system in which atmospheric Kr was sorbed is shown in Fig. 1. It comprises high-efficiency aerosol filter for air purification from dust particles, air flow-rate and volume meter fitted with water drop trap, water vapour trap consisting of 3 different glass bubblers at dry ice (DI) temperature and CO₂ trap — 2 glass bubblers (adsorbers) containing molecular sieve 13X at water ice (WI) temperature. Further there is the proper adsorption part — a glass bubbler containing molecular sieve 5A (main adsorber) preceded by an empty pre-cooling bubbler, both in LN bath. Adsorption pressure and air flow could be controlled by 2 valves and the pressure was read by means of precision manometers. The air sample volume was 1.50 m³. The adsorption was carried out at the temperature -196°C (LN temp.), pressure 0.92 ata for 1.35 m³ and 0.60 ata for the final 0.15 m³, and at air flow 0.25 m³/h.

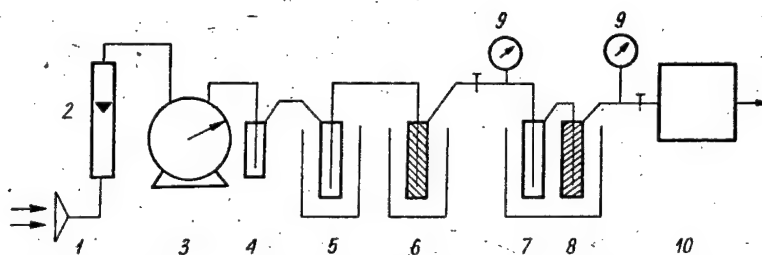


Fig. 1. Kr adsorption system: 1 — aerosol filter (HEPA), 2 — flow meter, 3 — gas counter, 4 — water drop trap, 5 — water vapor trap (DI), 6 — CO₂ trap (13X, WI), 7 — pre-cooling bubbler (LN), 8 — main Kr adsorber (5A, LN), 9 — precision manometers, 10 — forevacuum pump

The final reduction of pressure from 0.92 to 0.60 ata had the effect of decrease of desorbate volume by a factor of 3 without affecting observably the over-all efficiency of the process.

The desorption and concentration of Kr contained in the desorbate was carried out in a system called by us cascade desorption system. It consists in admitting the desorbate of the molecular sieve bed, by its own pressure, into a series of smaller adsorbers decreasing in size, and subsequent heating each adsorber to make the desorbate flow through next adsorbers (Fig. 2). Heating the last of them gives the needed small volume of desorbate with highly enriched krypton. In this system two additional adsorbers containing molecular sieve 5A in glass vessels called micro-bubblers were used; the masses of 5A were 1.05 and 0.050 grams in micro-bubbler A and B, respectively.

The desorption procedure involves, first, gradual heating, by changing baths, of the main adsorber (no. 8 in Fig. 1) — detached from the adsorption system (Fig. 1) and at-

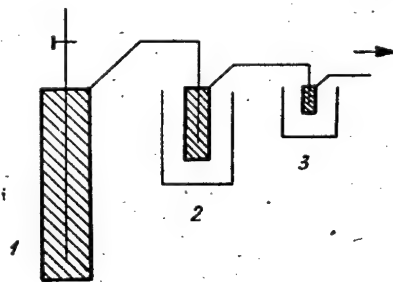


Fig. 2. Principle of cascade desorption system: 1 — main Kr adsorber, 2 — micro-bubbler A, 3 — micro-bubbler B (A and B initially in LN bath)

tached to the chain of 2 cascades of micro-bubblers — from -196°C to $+100^{\circ}\text{C}$, during which the desorbate passes through both of them maintained in LN temperature. After full desorption of Kr from the main adsorber and flushing it with helium a similar heating cycle is repeated on micro-bubbler *A*, with the next one still immersed in LN. Analogous flushing with helium ends this second heating cycle.

The final enrichment of krypton is made by heating the micro-bubbler *B* from LN to DI temperature — by placing it in DI bath — and then collecting the desorbate in the temperature range from -78°C to $+100^{\circ}\text{C}$ in an evacuated scintillation vial for measurement; the volume of this desorbate fraction is 6–7 ml. It is then dissolved in degassed toluene-based scintillator.

To avoid passing of ^{222}Rn (as well as ^{220}Rn) from the main bubbler, where it gets adsorbed along with Kr, into the enriched sample, there is a separate adsorber inserted in the cascade chain between main bubbler and first (*A*) micro-bubbler. It consists of an U-tube filled with 5A molecular sieve in DI temperature. It adsorbs the bulk of radon contained in the desorbate but has little effect on Kr passing through it.

Radioactivity measurements were carried out using Packard Tricarb type 3315 liquid scintillation spectrometer, both almost immediately after the sample was obtained, and later, in varying intervals, up to 6–8 weeks. These repeated measurements were made with a view to detect possible radioactive components other than ^{85}Kr by analysing the decay curve and to ascertain whether any measurable ^{222}Rn + daughters quantities were present. The liquid scintillator used was toluene + PPO + POPOP in ordinary proportions. It gave a background of 19–20 cpm.

The measurement system was calibrated using ^{85}Kr dilutions of known activity, prepared in latex meteorological balloons of about 2 m^3 air displacement at full shape, filled with 1.50 m^3 of air. Since no ^{85}Kr -free air is now available, plain atmospheric air was used and calibration results were corrected for atmospheric ^{85}Kr content. Calibration samples were processed in exactly the same way as measured samples. These calibration ^{85}Kr samples were prepared from a secondary dilution of a reference source of $^{85}\text{Kr}^{11}$ prepared in a steel cylinder 40/ in volume. The results of the recent series of calibrations are given in Table 1. Their standard deviation is 11.5 per cent.

Detection limit of the method, determined as ^{85}Kr activity corresponding to 3-sigma statistical error of the background, is 0.12 Bq (3.3 pCi) per sample or 0.08 Bq/m^3 (2.2 pCi/m^3).

The counting effectivity for ^{85}Kr dissolved in toluene-based liquid scintillator was measured using a mixture of air, argon, helium, stable krypton and ^{85}Kr of known activity imitating enriched sample. The counting effectivity was found to be $1.73\text{ Bq.s.count}^{-1}$ (58 per cent) its standard deviation slightly exceeding 2 per cent for 9 samples prepared at different times.

Statistical errors in activity measurements of atmospheric and calibration samples were kept low by choosing adequate counting times. Taking into account other errors (one of them is ^{85}Kr reference source radioactivity error), the over-all error of a single measurement may be assumed not exceeding 15 per cent.

¹¹ Produced by CEA, Saclay, France; activity determination accuracy $\pm 1.5\%$.

Table 1. Calibrations in the period Sept. 1976-Sept. 1977
(means of 2 values in each month)

Month	^{85}Kr radio-activity added, Bq	Net counts incl. atmosph. ^{85}Kr , cps	Net counts corr. for atm. ^{85}Kr , cps	Calibration factor Bq.s . count $^{-1}$
Sept. 76	3.31	1.18	0.86	3.84
Oct.	3.27	1.35	1.09	3.00
Nov.	3.23	1.35	1.00	3.24
Dec.	3.20	1.08	0.73	4.38
Jan. 77	3.14	1.07	0.72	4.38
Feb.	3.12	1.05	0.71	4.40
Apr.	3.04	1.26	0.85	3.58
May	3.00	1.23	0.78	3.84
June	2.96	1.07	0.70	4.23
July	2.92	1.16	0.76	3.84
Aug.	2.89	1.12	0.73	3.96
Sept.	2.86	0.98	0.72	3.97
Mean				3.89
Stand. dev.				11.5

All atmospheric ^{85}Kr measurements were carried out in cycles of 3 determinations each: calibration, blank sample and atmospheric sample. Samples considered blank were actually atmospheric ones with small air volume used (0.20 m 3) so that ^{85}Kr contained in it gave a count rate not much in excess of the detection limit. Atmospheric air samples were taken at this Laboratory in Warsaw, at the height of 8 m above ground level. Each month at least two measurement cycles have been carried out.

3. Results and Discussion

The results of measurements covering the period July 1975-November 1977 are summarized in Table 2 reporting single results and in Fig. 3 showing quarterly means. The lowest concentration of 0.22 Bq/m 3 (6 pCi/m 3) was observed in Jan. 1976, the highest ones in April and May 1977, and in Aug. 1976, of 1.15-1.25 Bq/m 3 (32-34 pCi/m 3). As may be seen in Table 3, there is a slowly increasing trend of ^{85}Kr atmospheric concentrations, between 1975 and 1976, followed by a sharp increase in 1977. The mean concentration of 17.0 pCi/m 3 found in 1975 is similar to the corresponding value of 16.2 pCi/m 3 reported by Tertysnik *et al.* [8] for the USSR European territory, and also to the values found in the other European location [6, 9], and in the United States [15]. It seems to confirm former assertions [3, 14] as to relatively uniform distribution of ^{85}Kr in the Earth's atmosphere.

It is a well-established fact that the present ^{85}Kr inventory in the atmosphere stems primarily from nuclear fuel reprocessing plants; the gradual increase of mean concentrations of ^{85}Kr is a reflection of growing amounts of such fuel being reprocessed in the

Table 2. ^{85}Kr concentrations in air in Warsaw in the period July 1975–Nov. 1977

Sampling date	^{85}Kr concentration, Bq/m ³	Sampling date	^{85}Kr concentration Bq/m ³
1	2	1	2
02.07.75	0.51	24.08.76	1.25
11.07.75	0.83	09.09.76	0.93
18.07.75	1.04	10.09.76	0.77
29.07.75	0.88	08.10.76	0.81
06.08.75	0.48	27.10.76	0.57
22.09.75	0.68	24.11.76	0.95
07.10.75	0.87	30.11.76	0.91
21.10.75	0.69	13.12.76	1.13
29.10.75	0.51	17.12.76	0.72
06.11.75	0.52	04.01.77	0.74
12.11.75	0.40	19.01.77	1.14
14.11.75	0.64	11.02.77	0.94
28.11.75	0.52	17.02.77	0.88
05.12.75	0.56	11.03.77	1.10
12.12.75	0.53	31.03.77	1.15
30.12.75	0.41	18.04.77	0.98
06.01.76	0.42	25.04.77	1.23
14.01.76	0.22	17.05.77	1.22
13.02.76	0.54	24.05.77	1.16
20.02.76	0.52	13.06.77	0.95
27.02.76	0.68	22.06.77	1.06
23.03.76	0.44	05.07.77	1.08
30.03.76	0.38	12.07.77	1.09
27.04.76	0.65	17.08.77	1.11
28.04.76	0.50	23.08.77	0.96
25.05.76	0.77	16.09.77	0.61
28.05.76	0.71	29.09.77	0.77
25.06.76	0.77	27.10.77	0.90
29.06.76	0.79	28.10.77	0.54
12.07.76	0.90	15.11.77	0.85
20.07.76	0.63	21.11.77	0.79
18.08.76	1.10		

world. Since the production and release of this radionuclide is not uniformly distributed in time and space (Earth's surface), one cannot expect its concentrations at a given point being only slowly variable in time. The temporal variability of ^{85}Kr concentrations as shown by the data in Table 2 may be regarded as the result of varying release of this gas in European countries in which fuel reprocessing plants are in operation. ^{85}Kr concentrations observed in Poland are probably dependent on prevailing wind direction (air masses movement) at a given time.

Although ^{85}Kr is poorly soluble in water [16, 17] it is probably to some extent washed-out from lower layers of the troposphere by rains. This may be partly the cause of low mean ^{85}Kr concentration values in some periods of time.

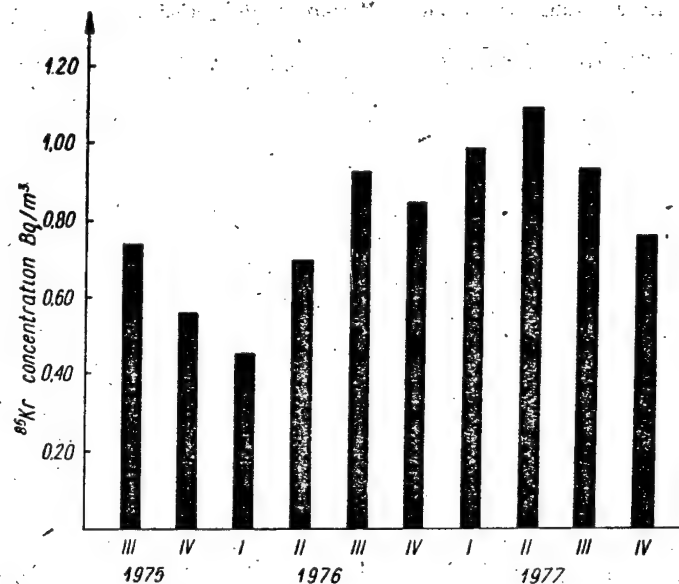


Fig. 3. ^{85}Kr concentration in air in Warsaw in the years 1975-77

Table 3. Mean ^{85}K concentrations in air in Warsaw in the years 1975-77

Year	Mean ^{85}K concentration Bq/m ³ (pCi/m ³)
1975 ¹⁾	0.63 (17.0)
1976	0.72 (19.5)
1977 ²⁾	0.93 (25.1)

¹⁾ Jul. through Dec.

²⁾ Jan. .. Nov.

Table 4. Estimate of annual radiation doses due to ^{85}Kr , in 1977

Organ	Annual dose per person Sv/yr (mrem/yr)
Skin (dose at depth of 0.07 mm)	25.9×10^{-8} (25.9×10^{-3})
Lungs	10^{-8} (10^{-3})
Whole body	0.6×10^{-8} (0.6×10^{-3})

The temporal changes of ^{85}Kr concentrations in atmospheric air depend thus, on many variables, of which the increase of ^{85}Kr releases and atmospheric diffusion seems to be most significant.

The presence of ^{85}Kr in the atmosphere is connected with a small radiation hazard to population. In submersion, it acts on human organism in three ways: there is an exposure to skin, to lungs and to whole body. Using concentration — to-dose conversion coefficients reported by Klement [18] the doses assessment for the year 1977 has been

made and presented in Tab. 4. As can be seen, the dominating skin dose is of the order of 3×10^{-7} Sv (30 μ rem) per year per person. This is not much as compared with annual doses due to natural radiation background (about 10^{-3} Sv or 100 mrem); however, it should be considered that these low-level doses are continually increasing.

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REFERENCES

1. K. TELEGADAS, G. FERBER: *Science*, 882 (1975).
2. G. DELIBRIAS, C. JEHANNO: Atmospheric Activity due to Krypton-85. *Bull. Inform. Sci. Techn.*, 30, 14 (1959).
3. R. PANNETIER: Distribution, transfert atmosphérique et bilan du Krypton-85. Rapport CEA-R-3591 (1968).
4. J. SCHRÖDER, K. O. MÜNNICH, D. H. EHHALT: Krypton in the Troposphere. *Nature*, 233, 5322, 614 (1971).
5. T. WARDASZKO: Contamination of the Atmosphere with Krypton-85 in Poland. In: Noble Gases, Proc. of a Symp., L. Vegas, Nev., Sept. 1973.
6. H. STOCKBURGER, A. SITTKUS: Messung der Kr-85-Aktivität der atmosphärischen Luft. *Z. Naturforsch.*, 30a, 959 (1975).
7. K. RÓŻAŃSKI, A. OSTROWSKI: Measurements of Atmospheric Krypton Radioactivity. *Nukleonika*, 22, 343 (1977).
8. E. G. TERTYŠNIK, A. A. SIVERIN, V. G. BARANOV: Koncentracija ^{85}Kr v atmosfere nad territoriej SSSR v 1971-75 gg. *Atomnaja En.*, 42, 145 (1977).
9. E. CSONGOR: ^{85}Kr Activity in the Environment. Proc. of the Symp. on Low-Radioactivity Measurements and Applications. Oct. 1975, The High Tatras, Czechoslovakia.
10. R. E. SHUPING, C. R. PHILLIPS, A. A. MOGHISSI: Krypton-85 Levels in the Environment Determined from Dated Krypton Gas Samples. *Rad. Health Data and Rep.*, 11, 671 (1970).
11. R. E. JAQUISH, F. B. JOHNS: Concentrations of Kr-85 in Air. In: the Natural Radiation Environment II (J. A. S. ADAMS, W. M. LOWDER, T. F. GESELL, eds.) U.S. E.R.D.A. report CONF-720805-P2, 1972.
12. D. E. BERNHARDT, A. A. MOGHISSI, J. A. COCHRAN: Atmospheric Concentrations of Fission Product Noble Gases. In: Noble Gases (see Ref. 5).
13. W. L. BOECK: Meteorological Consequences of Atmospheric Krypton-85. *Science*, 193, 195 (1976).
14. L. FARGES, F. PATTI, R. GROS, P. BOURGEON: Activité du krypton-85 dans l'air des hémisphères Nord et Sud. *J. Radioanal. Chem.*, 22, 147 (1974).
15. Radiological Quality of the Environment in the United States, 1977, EPA 520/1-77-009, Edit. Kurt L. Feldmann p. 11 (1977).
16. W. P. KIRK: Krypton-85: A Review of Literature and Analysis of Radiations Hazards. EPA, Office of Res. and Monit., Jan. 1972.
17. J. TADMOR: Deposition of ^{85}Kr and Tritium Released from Nuclear Fuel Reprocessing Plant. *Health Phys.*, 24, 37 (1973).
18. A. W. KLEMENT JR., C. R. MILLER, R. P. MINX, B. SHLEIEN: Estimates of Ionizing Radiation Doses in the United States 1960-2000. Rep. of the US EPA, Office of Radiation Programs, 1972.

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ENVIRONMENTAL PROTECTION PROBLEMS DISCUSSED

Warsaw NOWE DROGI in Polish No 7, Jul 78 pp 85-97

[Article by Stefan Jarzebski: "Protection of the Natural Environment"]

[Text] Today more and more attention is being devoted both in Poland and throughout the world to phenomena occurring due to man's influence on the environment. Also there is more and more frequent emphasis not only on the positive aspects of man's influence but also negative effects. Growing awareness of these effects has resulted in related problems being increasingly more extensively reflected in politics, the economy and propaganda, in scientific research and technical-organizational activities.

This problem area rapidly evoked response and understanding in our country, taking the form of organized action. One measure of the significance which is attached in Poland to problems of environmental protection is the fact that the environment has been recognized as the property of the people as a whole. This has found expression in the Constitution of the Polish People's Republic, in which Article 12, Point 2 states: "The Polish People's Republic shall ensure protection and rational utilization of the environment, which belongs to the people as a whole." The "Basic Points of the Environmental Protection Program Running to 1990," which have been implemented in Poland for several years now, were drawn up as a result of many years of work by experts, were examined by the Presidium of the Government and ratified by the PZPR Central Committee Politburo.

The broadly-defined problem area of environmental protection has also seen efforts undertaken on an international scale. In conformity with a resolution passed at the 23d Session of the UN General Assembly, a report by UN Secretary General U Thant on the subject "Man and the Environment" was published in 1969.

Processes of adverse changes in the environment as a consequence of man's economic activities have occurred in this country most markedly in that area characterized by the country's largest concentration of industrial plants, urban areas and population, that is, in Katowickie Voivodship. In this area industry has led to considerable distortions and changes in the biological proportions of the environment, to pollution of the air by discharged

particulates, gases and fumes of various substances and chemical compounds, collection of large quantities of industrial and municipal waste, water contamination by sewage and industrial effluents.

But in this same area numerous investigations and studies were conducted as early as 1953, with the participation of scientists and eminent practical experts, aimed at determining the scope of degradation of the environment, with determination of methods of countering further worsening of living conditions and destruction of the environment. The activities of the Scientific Committee formed toward this end found expression in numerous studies of problems connected with the Upper Silesian Industrial District, problems of air pollution, water management, industrial and municipal activities, protection against water pollution, utilization of industrial waste and reclamation of considerable industry-utilized acreage, intensification of agriculture and forest management under conditions of intensive influence by industry, problems of transportation, problems connected with the results of mining operations, climate, as well as the aggregate of management and utilization of land both in the Upper Silesian Industrial District and throughout Katowickie Voivodship.

The Committee's activities fully justified establishment in that area of a permanent scientific research facility. There was subsequently established in 1961 the Scientific Research Establishment of the Upper Silesian Industrial District of the Polish Academy of Sciences, headquartered in Zabrze, reorganized in 1970 into the Industrial Regions Protection Institute, and in 1975 elevated to the rank of Institute of the Fundamentals of Environmental Engineering of the Polish Academy of Sciences. I should like to present some reflections and conclusions which seem quite obvious on the background of the results of the institute's work up to the present time.

The Air

This country's total emissions into the atmosphere of unpleasant, often harmful pollution, in the form of particulates and gases from industry, municipalities, dumps and tailings is estimated (excluding carbon dioxide) at approximately 11 million tons annually. Particulates comprise approximately 33% of this total, sulfur compounds 27%, carbon monoxide 18%, various hydrocarbons 10%, and oxides of nitrogen 9%. Other compounds are released in smaller quantities. Industry discharges 70% of pollutants. Municipalities account for approximately 10% of air pollution, transportation -- 12%, dumps, tailings and spoil banks approximately 6%. On a regional breakdown, the leader in air pollution is Katowickie Voivodship (31% of gas pollutants and 26% of particulates). Industrial plants in the following voivodships also discharge large quantities of particulates and gases: Krakowskie, Lodzkie, Warszawskie, and Koninskie. Numerous large industrial plants in Poland were on the list of major offenders (in 1975 they discharged 2,335 thousand tons of particulates and 3,347 thousand tons of gases). We should add that emission of particulates and gases increased in comparison with the preceding year. It is estimated that 14.1% of industrial plants have 90% effective particulate-removal equipment; 15.5% of plants have no particulate-removal equipment.

A large number of plants do not have a designated pollution buffer zone. Only 14% of the heaviest-polluting plants regularly measure pollutant emissions, 50% measure sporadically, while 36% take no measurements whatsoever. There are still many large plants in this country which do not employ specialists in the area of air pollution.

Toward the end of 1975 there were more than 8.5 million dwelling units in this country, only 2.6 million of which burned gas. In connection with this fact, at that time residential furnaces were discharging each year approximately 700,000 tons of particulates, 160,000 tons of sulfur compounds, 160,000 tons of carbon monoxide, plus 80,000 tons of other pollutants. In addition, the motor vehicles traveling on our country's roads and highways emit approximately 950,000 tons of oxides of carbon, approximately 250,000 tons of hydrocarbons, 110,000 tons of oxides of nitrogen, plus 50,000 tons of other substances. To complete the picture we should add that dumping of industrial waste as well as municipal dumps cause secondary discharge of particulate air pollutants estimated at more than 500,000 tons annually.

More and more money is being spent each year on combating air pollution. A total of 540 million zlotys was allocated for this purpose in 1970, while in 1975 expenditures totaled more than 1,300 million zlotys, and last year 2,100 million. These funds are being spent chiefly for installation of equipment to trap particulates. In 1975 there were more than 13,000 units of such equipment (cyclone dust extractors, cloth filters, static precipitators, and wet dust extractors). The above-listed equipment trapped more than 22 million tons of particulates, which comprises approximately 85% of total pollutants. In addition, installed wet-type units trapped at least 450,000 tons of sulfur dioxide.

There are two opposing concepts in this area. The first proceeds from the position that the earth's atmosphere possesses unlimited self-cleaning capability. Specific studies of changes in the atmosphere caused by discharged gas and particulate pollutants indicated that these changes take place very slowly, while the end product which precipitates to the earth together with fog or rain causes incalculable adverse effects on plants, animals, and man. The solution proposed as a preventive means by the advocates of this concept, based on carrying discharged pollutants to high altitudes with the aid of building tall chimneys, has proven ineffective in practice. The local reduction in concentration of particulates and gases achieved with this technique came at the cost of a substantial increase in the area they would affect, since pollutants carried at higher altitudes are able to spread over a larger area.

The other concept is based on reducing discharge of pollutants at the source, by: technological procedures in industrial processes, purification (neutralization) of stack gases, and employment of so-called no-waste technologies. Although the technological changes connected with this do not totally eliminate the harmful components contained in discharged gases, they do limit the magnitude of emissions. In effect technological modernization can

greatly increase protection against air pollution. These changes consist, speaking in general terms, in preventing or partially neutralizing discharged pollutants at the very source, that is, in the equipment in which a manufacturing process occurs. This can be achieved by better selection of raw materials, change in production process and equipment design parameters, etc.

Obviously changes in manufacturing processes do not by themselves solve the problem, for they reduce the quantity of emitted pollutants but do not eliminate them. Therefore in the subsequent phase stack gases should be rigorously subjected to depollution with the aid of various equipment. Unfortunately we produce too little of this equipment, and collaboration among branches of industry is not sufficiently close and well-coordinated in this field.

One of the most modern and effective solutions in the area of air (water, soil) pollution is the employment of waste-free, clean technologies. Everything which has been extracted and produced (even as waste), which is still frequently irrevocably lost, should be retained and utilized. The recommendations of the Second National PZPR Conference clearly specify the direction of actions to take in this area. Scientific thought has proceeded in support of these recommendations. For example, much dust is generated in the process of open-hearth steelmaking, dust which contains numerous valuable components in quantities which frequently exceed their content in ore mined in this country or purchased abroad (iron, zinc, lead). At the present time our open-hearth furnaces are not equipped to extract particulates from gases. Unfortunately attempts to interest industry in this problem have not yet been successful.

The largest quantities of pollutants are generated in producing electricity and heat from solid fuels. The problem of total utilization of coal by means of gasification or fluidization fascinates industry and science, since it would ensure better recovery of gas components, elimination of air pollutants, as well as fuller utilization of the thermal energy contained in the fuel. Intensive research and engineering projects have been conducted in Poland in this area.

The burning of coal in home furnaces, in view of the large-scale character of this activity, is an important problem which must be resolved. More than 22 million tons of coal are consumed in Poland in home furnaces; this is a substantial quantity, representing more than 12% of total production. It is a generally known fact that with this form of consumption utilization of this valuable fuel is minimal, while there is a substantial increase in environmental pollution, for residential chimneys, which essentially are not very tall, eject particulates and gases which, when atmospheric conditions are right, are transformed into so-called "smog," which is particularly deleterious to health. This area also contains considerable raw materials reserves.

We could cite more examples. But we have enumerated the most general tasks implementation of which could result, without the need for greater capital spending, in better air quality by eliminating various pollutants. It would

seem that alongside increasing the manufacture of appropriate equipment, we should draw up for industrial plants (with annual revisions) figures on allowable quantity of emitted pollutants and enforce the designated quantities in conformity with existing regulations, regularly monitor discharge of pollutants into the atmosphere by industry, designate pollution buffer zones and monitor their systematic utilization. Industry on the other hand should organize regular monitoring of pollutant emissions and emissions in plant pollution buffer zones (precipitation and concentration of particulates, sulfur dioxide, oxides of nitrogen, carbon monoxide and other pollutants specific to the given plant), should establish pollution buffer zones and programs for their maintenance, should elaborate a program (and monitor its systematic implementation) in the area of reducing pollutant emissions through changes in manufacturing processes and installation of more effective equipment, should organize or further develop air pollution services, should install particulate-removal and stack gas-scrubbing equipment and ensure their proper operation and maintenance, should utilize waste materials, and should cooperate on a regular basis with research establishments in the area of methods and means of reducing emission of pollutants into the atmosphere and improved utilization of trapped waste materials.

Only proper cooperation between industrial enterprises and government agencies as well as productive participation by scientists can produce the improvement in air quality so hoped for by the inhabitants of industrial regions.

Water Conservation and Water Management

Poland is not particularly rich in water resources. Mean annual precipitation, according to figures covering a span of many years, totals 602 mm, while annual per capita surface water runoff totals barely 1,660 m³. As a result of industrial growth as well as population growth, both water demand and consumption are increasing substantially. Approximately 70% of total water drawn is consumed by industry, with the following the heaviest water users: mining, power engineering, chemical industry, metallurgy.

In addition to possessing meager resources, unfortunately the degree of water pollution in Poland is very high. Only a few rivers in Western Pomerania and the extreme northeastern part of the country are relatively unpolluted, while in the rest of the country only the river headwater areas are unpolluted.

The "Atlas of River Pollution in Poland in 1970," produced by the Institute of Water Management in Warsaw, on the basis of studies conducted in 1968-1970, indicates a poor overall condition of the waterways covered by the studies. Out of 12,506.2 km of river length (during the period of normal water level), 3,543.7 km remained unclassified, while 8,962 km were classified, with 3,101.0 km in class I, 3,655.5 km in class II, and 2,206.0 km in class III. It follows from the above that during the period of normal water level more than 28% of the examined 12,506 km of rivers is polluted to a degree exceeding current classification standards.

The waters of the Vistula, regulation of which is directly affected by the resolution of the 12th Plenum of the PZPR Central Committee, exceed present standards along a total stretch of 531 km, which comprises more than 54% of the river's total length. The waters of the Vistula are polluted chiefly by its tributaries, which unfortunately perform the function of sewage and waste removal, both for large cities (the following rivers: Biala, Wilga, Dlubnia, Drwina, Suchy Jar), industrial areas (the rivers Gostynia and Przemsza), or industrial plants located on them (the rivers Kaskada and Wlosienica, Bren). The most highly-polluted rivers, beyond classification limits (that is, with water quality below class III), include the following: Wisloka, Wislok, Wieprz, Bzura, and the lower San. On the other hand, small quantities of relatively unpolluted water are to be found in the Sola, upstream on the Skawa, in the Raba, Dunajec, upstream on the San, in the Pilica, Drweca, Wda, and Narew.

The Oder is already excessively polluted upstream as a result of pollutants originating in Czechoslovakia's Karvinna-Ostrava Industrial District, with almost 52% of the entire length of the river polluted. On Polish territory the Oder is polluted by industrial centers in Raciborz, Kedzierzyn, Zdzeszowice, Krapkowice, Wroclaw, Brzeg Dolny, Nowa Sol, and in Szczecin, as well as industrial plants in Fuerstenberg (GDR). The following tributaries are the most highly-polluted with mineral and organic compounds: Ruda, Bierawka, and Klodnica, while a beneficial contribution, diluting existing pollutant levels, is made by the relatively unpolluted waters of the Olza, Nysa Klodzka and Luzyczna, Sleza, Osobloga, Mala Panwa, Stobrawa, Olawa, Widawa, Barycza, Obszyca, Bobr and Warta.

We should emphasize the fact that the waters of both of Poland's major rivers exceed salinity limits over almost 7% of their length. This is caused by intensive development of coal mining, with the discharge of large quantities of water pumped from the mines, characterized primarily by considerable salinity.

There is also occurring increasing pollution of some of the lakes of Pojezierze Mazurskie. Factors in increasing the salinity of these lakes include the development of thermal power engineering, with heat and power plants, sited primarily on lakes, discharging heated water, which disrupts the biological balance and produces excessive aquatic plant growth. This problem has been solved by stocking these bodies of water with the plant-eating White Amur.

It is a fact that water pollution is caused primarily by industrial plants, which in Poland are even greater water consumers than in many other countries and which as a consequence discharge correspondingly larger amounts of polluted water. It is estimated that 67% of effluents are discharged by industrial plants, while only 33% is discharged from the sewer systems of cities and towns. Almost 40% of the close to 11 billion cubic meters of pollutants which make their way into surface waters comprise effluents which require treatment, while approximately 60% is cooling water. Scarcely 60% of effluents requiring treatment are in fact treated, while the remaining 40% is discharged into the rivers loaded with pollutants.

Chemical plants are the biggest contributors to water pollution, due to the specific composition of the pollutants, as well as heavy industrial plants, particularly steel mills and coking plants, which discharge effluents polluted with suspended matter, cyanides, phenols, acids, mineral oils and heavy metals, as well as pulp-paper and fiberboard plants, which discharge effluents which are heavily polluted with organic substances which are only partially biodegradable. Coal mining enterprises discharge effluents containing large quantities of suspended matter and mineral salts, particularly sodium chloride and sulfates. Removal of mineral salts from mine discharge water is a problem which must be solved.

Many cities and towns in Poland do not have sewage treatment plants and discharge raw sewage directly into rivers. Industrial plant effluent treatment facilities which were built many years ago are obsolete and fail to do the job. Some of these facilities were not adapted to increasing production targets, as a consequence of which they are substantially overloaded. It is true that there is increase in both the quantity of monitoring procedures conducted at water-polluting enterprises as well as the amount of fines imposed, but it would seem that more efficient activities by monitoring entities and consistent enforcement of the levying of fines could result in more rigorous adherence to regulations.

More and more attention is being devoted in Poland to the problem of water conservation and proper water management. One measuring stick of the interest shown is the amount of capital spending designated for water management and water conservation. In 1976 the figure exceeded 12 billion zlotys, that is, almost 3 times as much as in 1970. In view of the strong emphasis placed on this problem by the 12th PZPR Central Committee Plenum, rapid determination of the areas of further efforts and effective utilization of growing money expenditures for these purposes is essential.

It is becoming absolutely essential to build new sewage treatment plants in cities, towns and at industrial enterprises, as well as to modernize and improve the efficiency of existing equipment, including by the addition of second and third-stage treatment, that is, an organic compounds biodegradation unit, as well as nitrification and denitrification processes. Concentration of funds and monitoring, as well as improvement in the effectiveness of equipment installed at those plants which present the greatest threat to the environment should produce fast, tangible results. In connection with the program of intensification of agricultural production and livestock raising, it would also seem indicated to build and install small container-type treatment units in villages and at stock farms.

An important stage in improving water management is to bring effluents, by means of appropriate treatment, to such a degree of purity that the treated water could be utilized as recycling industrial-process water. This can be achieved by building open or closed-cycle cooling systems operating with maximum concentration of circulating water. Adoption of such equipment in industry will greatly contribute to the elimination of effluent discharge and more efficient water management.

Construction of holding ponds and water transfer is an important task. As regards activities in the area of water treatment and efficient water management, we must mention the tasks facing scientists. These include such areas as:

- development of water and sewage treatment technologies as well as design of equipment adapted to the specific features of individual industrial enterprises;

- development of processes of utilization of heavily polluted and saline water;

- employment of new methods of improving water in open and closed-cycle circulating systems, with maximum concentration of cycle water;

- development of methods of extracting secondary raw materials contained in effluents, management and utilization of sewage sludge;

- acceleration of the process of water self-cleaning and methods of eliminating pollutants deriving from agricultural chemical runoff.

Deformation of the Terrain

More than 150,000 hectares in Poland have been degraded and denuded due to mining and industrial operations. Mining and power engineering are responsible for deformation of approximately 60% of this total. This land comprises sand pits, spoil banks from mining operations, as well as power plant slag and ash heaps. Degraded land, usually designated as "industrial waste land," also creates serious problems of a socioeconomic nature. One of the negative phenomena attending mining activity is the creation of substantial soil-stripped areas and sand pits. This is a serious problem if we take into consideration the fact that mine-fill sand removal operations ruin each year an average of approximately 200 hectares of land (primarily forest). The total area involved in mine-fill sand production is approximately 6,000 hectares. As a result of sand-stripping operations, changes are taking place in conditions of water runoff, agriculture and forestry, as well as microclimatic changes in and around the sand pits. On the other hand, removal of sand to fill underground cavities produced by mining operations prevents underground mining from producing harmful effects on the surface terrain, and makes it possible to mine rich coal seams involving protective pillars underlying some urban areas. The problem is a complicated one and demands a compromise between considerations of environmental protection and the requirements of the economy. Almost one out of every 3 tons of coal produced today involves backfilling to replace the removed coal. It is not surprising that the mining industry's sand consumption continues to be substantial.

The results of removal of sand deposits are neutralized by reforestation or the creation of water reservoirs in the abandoned sand pit. Reforestation is the principal method of reclaiming land disturbed by mining operations. The objective is to restore the soil and, to the extent possible, all

other natural and man-made elements required for reforestation, forest development and economic exploitation. A positive result of reforestation is the planting of forest consisting chiefly of deciduous species resistant to the harmful particulates and gases discharged into the atmosphere by industry.

A very important trend in reclamation of sand pits is the construction of multi-purpose reservoirs, utilized both for recreation and water retention, as well as an impoundment for municipal, industrial and agricultural water needs. More than 1,400 hectares of abandoned sand pits will be reclaimed by 1990 with water impoundment projects.

An important category of waste land resulting from coal mining operations comprises the overburden heaped up in the course of getting to and working seams, as well as mechanical coal concentration activities. Suffice it to say that there are approximately 240 dumps of this type localized in the coal basin, occupying an area of more than 1,370 hectares. The Ministry of Mining has predicted that an additional 400 hectares will be added by 1985. Increased coal production targets will substantially accelerate this process, for production of a ton of coal is usually accompanied by 0.4 tons of waste of various kinds. This attests to the acuteness of the problem. It is true that the Ministry of Mining projects that in the current five-year plan approximately 85% of underground rock deriving from current production will be utilized as mine fill as well as in various construction projects. The present situation seems to indicate, however, that these forecasts are excessively optimistic.

An important problem in reclamation activities is presented by spoil banks situated among urban-industrial development. They are unsightly and result in secondary air pollution. In the future many such piles of waste rock will be removed in view of an acute shortage of building sites as well as needs connected with waste utilization and secondary coal recovery. In view, however, of the extremely adverse effect on the environment, we cannot wait until these piles are removed. We must develop new, effective, and at the same time economically-substantiated methods of covering these spoil banks with vegetation. The cost of reclamation by the traditional method, that is, employment of rooted seedlings, is very high. Research conducted at the Polish Academy of Sciences Institute of Fundamentals of Environmental Engineering in Zabrze has come to our assistance. With the aim of temporarily covering spoil banks with tall vegetation, seedlings of vegetative origin (so-called stem cuttings) have been utilized for the first time in Poland. This new method of reclamation has proven to be 10 times cheaper than the traditional method.

Reclamation of so-called central dumping grounds, ranging from 100 to 1,500 hectares in area, is an important problem. Occupying old sand pits, they are located on the edges of the Upper Silesian Industrial District, for the most part among recreational forest lands. In view of the fact that these forests are particularly susceptible to industrial pollution, it is necessary to reforest the wooded acreage destroyed in sand removal operations, at the same time replacing conifers with deciduous species or mixed forest. The substantial acreage of newly-created dumping grounds and the urgent necessity

of increasing forested acreage in a highly-urbanized region compels us to adopt reforestation reclamation, totally bypassing the so-called pioneer vegetation stage. The program adopted in Katowickie Voivodship specifies that in the period 1975-1985 more than 1,050 hectares of mining operation dumping grounds will be reclaimed and replanted.

The brown coal industry is concentrated in three districts: the Turoszowski, Koninsko-Turecki, and Zarski. Here the importance of this problem is determined first and foremost by the magnitude of agricultural and forest land occupied by industry. Planned development of additional strip mines (including at Belchatow) will increase this area severalfold. It is estimated that by 1980 strip mining will swallow up from 56 to 66 thousand hectares of productive land.

The results of more than 10 years of research and studies conducted in the brown coal industry with the participation of the Institute of Formation and Protection of the Environment of the Academy of Mining and Metallurgy in Krakow as well as the Polish Academy of Sciences Institute of Fundamentals of Environmental Engineering in Zabrze have made it possible to elaborate long-range plans and planning documents for reclaiming land denuded by brown-coal strip mining. Reclamation runs in a four-year cycle and encompasses the following: grading of the land in conformity with the requirements of the specified type of reclamation; adjustment of hydrological conditions; establishment of suitable soil conditions for growth of vegetation; planting of vegetation as well as technical-biological slope grading to ensure stability, as well as construction of essential access roads.

This problem applies particularly to the Koninskie and Belchatowskie Coal Basin. An exceptionally important task in this area is elaboration of a suitable model of biological regeneration of denuded land. As a result of conducted research, an agricultural recultivation model was elaborated, which specifies, with appropriate mechanical soil cultivation as well as application of mineral fertilizers suited to the specific conditions, producing yields in the order of 40 quintals per hectare. In the Turoszowskie Basin reforestation-type reclamation will predominate.

Important tasks proceed from the fact that flotation waste is produced as a result of wet concentration processes used on nonferrous ores. This waste is transported in the form of suspended matter by hydraulic transport to special settling ponds. The bulk of the waste of this type has been scattered over the Bytomska, Olkuska, and Lubinska Basin. In view of the heavy quantities of dust generated, they constitute the industrial waste group which is most harmful to the environment.

The dynamic growth of thermal power, expressed in a doubling of installed generating capacity every 7 to 10 years, has resulted in an immense increase in the quantity of furnace waste to be dumped. As a result of burning increasingly lower grades of coal (muly, przerosty) as well as power coal with a high sulfur and ash content, with an increasing percentage share of brown

coal, and under the influence of a demanded improvement in efficiency and layout of equipment, the quantity of furnace waste is increasing more rapidly than growth in generated electric power. The total surface area of furnace waste dumps will probably reach around 6,000 hectares by 1990, while approximately 30% of presently existing dumping grounds in the public utility power industry is already completely filled or is in the terminal phase of dump filling. These areas demand in the near future protection against blowing of dust, biological recultivation and reclamation. One result of research and experimentation is establishment of methods of biological securement of dumping grounds against dust blowing and elaboration of the principles of their recultivation. This makes it possible to plant vegetation on power plant dumps without first covering them with a layer of topsoil. Tests conducted on growing various plants indicate diversified possibilities of purposeful dump reclamation. The adopted methods promote correction of the damage caused by industry as well as protection of the environment and landscape, as well as bringing measurable agricultural benefits.

Vegetation

Air pollutants, particularly sulfur and nitrogen compounds, have an adverse effect on vegetation, especially woodlands. Air pollution eliminates particularly susceptible coniferous species from tree stands. Deciduous species are also susceptible to pollution damage. These same causes also lead to damage to farm crops, reduce crop yields, and diminish their usefulness and nutrient value. There is also observed a decline in the quality of farm products as a consequence of occurrence of necrosis and damage as well as contamination caused by the settling of particulates on leaves, flowers and fruit. Heavy precipitation of particulates on plants creates difficult conditions for harvesting and threshing. Air pollution sometimes results in the accumulation of heavy metals in plant organs (zinc, lead, cadmium), which in general do not affect crop yields but can cause sufficient adulteration so that fruits, vegetables and feeds cannot be consumed.

Nonferrous metallurgical enterprises, particularly zinc and lead, present a serious threat to the environment. These enterprises, in addition to very large quantities of sulfur dioxide and oxides of nitrogen, also discharge other substances as well as particulates containing zinc, lead and cadmium. Studies conducted in the vicinity of zinc plants at Szopienice and Brzeziny indicated the following declines in crop yields at a distance of up to 2.5 km from the pollution source: potatoes to 70%, alfalfa to 60%, beans and barley to 10%. The decline in crop yields was chiefly caused by the effect of gaseous phytotoxic substances, causing damage to above-ground plant parts during the vegetation period. Absorption by plants of excessive quantities of zinc and lead does not initially restrict growth of biomass. Their toxic nature, however, substantially reduces the feed and industrial-use value of crop plants.

The effect of fluorine compounds discharged in large quantities by metallurgical plants, superphosphate plants, enamel glaze plants and many other industrial enterprises is greater than the effect of sulfur dioxide. The

greatest threat occurs in areas closest to the pollution source. When discharged from tall chimneys, however, larger quantities of fluorine are recorded at distances greater than 10 km.

Therefore it would seem advisable in areas with substantial air pollution to reduce the growing of crops which are highly susceptible to the harmful effects of emitted air pollutants, replacing them with more resistant plants. In planting orchards, one should select varieties which are more resistant to the effect of industrial air pollutants.

Little is presently known on the effect of emissions of industrial gases and particulates on animals. Work in this area has begun only in the last few years. Species most susceptible to industrial gas and particulate emissions include red deer, wild boar and roe deer, as well as hares and pheasant. It has been calculated that losses in the hare population in polluted areas runs about 45%.

Air pollution also has a very adverse effect on beekeeping. Emitted pollutants destroy the feed base and poison the nectare. As a result the bees become weak, incapable of effective pollination of farm crops, and produce less honey and wax. The result is a serious decline in production.

We should once again stress the very adverse effect of industry-emitted fluorine on animals. The most dangerous are plant species which, while not showing clear signs of damage, contain large quantities of fluorine in their leaves. Poisoning and illness of animals has been noted in areas where these plants occur. Polluted air and water, waste, noise and vibrations have an adverse effect on man's health and well-being. The effect of air pollutants has perhaps been determined to the greatest extent.

In urban areas health conditions are markedly worse than in other areas of Poland. The most common problems are chronic inflammation of the upper respiratory passages, chronic bronchitis, pneumonia and bronchial asthma. Also frequently occurring as a result of particulate pollution is inflammation of the nasal passages, inflammation of the throat, conjunctivitis, keratitis, and inflammation of the conjunctival sac. Analysis of public-health observations indicates that in the last decade respiratory affections have regularly shown a high incidence. In Katowickie Voivodship it is higher than the national average.

Because of the indirect and direct consequences of a decidedly negative character for man and society, protection and management of the environment are an urgent problem demanding action in many areas, particularly in the industrialized and urbanized districts. Essential in this action is cooperation between industry and the municipalities, scientific establishments and administrative agencies, and practically all of society. The criteria of a microeconomic approach should be replaced by macroeconomic and macrosocial criteria, taking into account both the costs of countermeasures and all losses occurring in man's environment due to threats to the environment.

The task of industry is particularly important. Industry is the principal cause of danger to the environment and must therefore bear the main burden of the effort to eliminate the negative effects of its activities. This applies to all aspects of environmental protection, that is, reducing to a minimum emission of pollutants into the atmosphere, treatment of industrial effluents, neutralization or utilization of production waste, reclamation of dumping grounds, and the campaign against noise. The most important thing is, first and foremost, proper conduct or even change in industrial processes, construction of highly-efficient antipollution equipment and regular monitoring.

Accomplishment of these tasks of course is connected with the need to make the public more responsive, active and aware of the need for all-out involvement in environmental protection. There must be public participation and monitoring in the process of utilization of expenditures on protection of the environment in the broadly-defined definition.

Concern for proper operation and maintenance of installed equipment is just as important as concern for efficient operation of production equipment and production proper. This is a particularly difficult and ticklish matter. Costly stack gas scrubbing equipment, industrial and municipal sewage treatment plants are frequently inefficient, shut down, and viewed as a fifth wheel on the cart, or they "complicate" production, raise costs, absorb personnel, and do not produce any direct production-economic effects. We cannot imagine any change in this erroneous approach without proper indoctrination of economic cadres and constant activeness on the part of party organizations and officials.

We are obligated to take these steps by the Politburo resolution, which in a farsighted manner encompassed complex problems of protection of the environment and specified a cohesive system of effective actions in that area.

The conditions of our system promote accomplishment of these tasks faster and more effectively than under capitalism. This demands, however, as was emphasized by Edward Gierek at the 12th Plenum of the PZPR Central Committee, a greater contribution by scientific establishments, daily concern on the part of the people working in the economy and administration, as well as the cooperation of the public as a whole. These are expensive tasks and require time. Consistent efforts and persistence in accomplishing them are particularly important.

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CSO: 5000

HAVANA BAY CLEANUP BEGINS; SOVIET EQUIPMENT USED

Havana JUVENTUD REBELDE in Spanish 19 Sep 78 p 2

/Article by Armando Alonso Rivero/

/Text/ Cleanup equipment acquired by Cuba in the Soviet Union recently went into service in the bay of the city of Havana for the purpose of eliminating the floating oil and solid pollutants.

The Ministry of Transportation is forming a sanitation unit which already has two cleanup vessels in the bay. There are plans to furnish the Havana port with new equipment and means for this purpose in the coming years.

The specifications on the new Soviet-made vessel are: maximum length, 14.85 meters, and beam 4.3; speed 3.8 knots with a 135-horsepower engine. The reception tank for floating solids holds 12 cubic meters and the two decantation tanks for the water and oil mixtures collected hold 8.7 cubic meters each.

Its average intake capacity is 3 to 4 tons per hour of oil in water and 1.5 for floating solids.

The pollution in the waters of Havana Bay is a problem which has been evolving since the colonial era and which reached its maximum during the capitalist period of developing the community and the industry around it. In 1959, we inherited the consequences of centuries of negligence in that regard.

From the mid-19th century, there is written evidence in the journal of a German sailor who, talking about the dirtiness of the waters of the port of Havana, mentioned the impossibility of washing his clothes in them.

Famous hygienists such as Dr Carlos J. Finlay and later, congresses of doctors and engineers also mentioned the unhealthiness of said waters in the first half of this century, and they cited as the main cause the dumping of industrial and sewer wastes from the city.

In 1936, a private entity undertook the cleanup of wastes in the waters of the bay but with highly unhealthy and ineffective methods. Later, in 1940, the former Ministry of Health created an office called Cleanliness. Lighthouses and Buoys, which had among its activities the collection of floating solids, without obtaining positive results either.

The pollution of the bay is to a large extent cumulative and therefore the birth of the National Merchant Marine after the triumph of the revolution--with only 14 old, small ships--was faced with this obstacle in its development, not overlooking the fact that the oldest vessels, just as the foreign ships with these specifications, contribute to some extent to the pollution of the environment. Our modern merchant vessels, taking this situation into account, have devices and equipment to prevent it.

The day will come when our merchant fleet, in its totality, will have greater scientific and technological advances in the area of environmental conservation, the only way for our maritime trade, which has already shown a dizzying level of advancement, to reach its highest development.

11937

CSO: 5000

RED TIDE RESEARCH IN CUBA

Havana JUVENTUD REBELDE in Spanish 29 Sep 78 p 2

/Article by Juan Dolset/

/Text/ There is a small, pleasant beach on the coast, a few kilometers from the city of Havana. Formerly, anyone going past it by sea would see that it looked sad in its loneliness. Yet that small beach which nobody enjoyed had a lord and master, a sugar industry magnate, from whom it got its name: Viriato Beach.

Everything in it has changed at this time, even its name, which currently is the Oceanology Institute Cove, because it is the site of that research center affiliated with the Academy of Science of Cuba.

There is bustle continually in evidence as people move about in what used to be a private residence and in the new buildings. Most of them are young people: scientists, researchers, students, intermediate technicians, and administrative and maintenance personnel. One can hear them discuss serious subjects and laugh at funny situations. They all have in common their love for the sea and for their work, which at times seems like a sport.

Unexpected Visit

On Monday the 11th of the current month, someone noted a band of beautiful red color in the water. The word spread around, and all the personnel had observed the novelty a short time later. Naturally, the inquisitiveness of scientific research immediately prompted the collection of water samples to determine the cause of the coloration.

Two causes were possible: contamination by the water of the river, or a large concentration of microscopic life forms of red color.

Coloration of a biological origin in itself is nothing new in the experience of oceanology. It had been already reported by Darwin on his famous and momentous trip, and even by Jules Verne in his novel "A Captain at 15."

It can be caused by various organisms. It frequently occurs in the Gulf of Campeche, Mexico. Under the name of red tide, one appeared a few years ago on the coasts of Florida and produced concern, because it killed a large number of fish. Not all the red tides are harmful.

Its presence among us is a novelty because it was noted only once, 6 years ago. It was promptly determined at the Oceanology Institute that it was not a product of environmental pollution. A multitude of live forms, brownish red in color, could be observed proliferating in a drop of water placed under the microscope. It was necessary to study the phenomenon closely; to determine the cause, the extent and the intensity of the population; and to periodically examine the waters of the cove and its surroundings, and other data of interest. The supervision of the task was assigned to Dr Luisa Lopez Baluja, who is also a professor.

The systematic collection of samples was organized, and a count was made of the population present in each drop to determine if it was increasing or decreasing. They had the offender identified within a few hours after the collection of the first sample. It was a single-celled alga of innocuous nature, because there were no dead fish in the sea, and it caused no reaction when it came in contact with the skin of the personnel of the institute, who even went swimming right into the red tide.

As far as botanists are concerned, the guilty microorganism is a plant. As far as zoologists are concerned, it is an animal. Because of its photosynthesizing ability, it is considered a plant--specifically, an alga--in the studies of the sea.

At the laboratory where the professor works, from where our attractive sea can be seen, JUVENTUD REBELDE posed some questions to the biologist. Her answers were concise.

Professor, is it natural for the red tide to occur? "Of course," she answers, "it is an absolutely natural phenomenon. It develops when one or several species of microscopic organisms concentrate in various amounts which are sufficient to produce a pronounced alteration in the coloration of the sea."

Does the microorganism responsible for the red tide that has been visited on the institute have a name and surname? "This blossoming can be considered a proliferation into dense concentrations of the dinoflagellate known as *Peridinium aciduliferum*. The decline of the concentration has been very fast."

Have you worked alone, or have you had help? "The collection of as much data as we have would have been practically impossible in such a short time--a few days--without teamwork. Actually, a considerable number of scientific workers of the Oceanology Institute participated. We had the enthusiasm and the endeavor of all the personnel. Cooperation was such that even the comrade watchman would collect samples at certain times after working hours."

Do you consider the task completed? "No. We continue to watch the waters where the tide made its appearance. On the other hand, we are compiling the large amount of data obtained, and it will be published later by the academy. It will be the first scientific information produced in Cuba about this phenomenon."

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CSO: 5000

FLOCKS OF WILDFOWL KILLED BY MISUSE OF PESTICIDES

Salisbury THE HERALD in English 26 Oct 78 p 15

[Text]

MISUSE of an aphid-killing chemical on grain-producing farms in Rhodesia is killing thousands of guinea-fowl, most species of waterfowl and many birds of prey, Mr Ron Thomson, a National Parks and Wild Life Management official, said this week.

The chemical, monocrotophos, is widely used to combat aphids in wheatlands. When double the strength recommended for killing aphids is used it is also highly effective in killing flocks of quelea birds, which make great inroads on grain crops if they are not controlled.

DUCKS

But it is equally effective in killing numerous other bird species who do not pose a threat to grain crops. Ducks especially are falling prey to the chemical—but numbers of birds that feed on poisoned quelea are killed as well.

According to Mr Thomson many farmers could not care less what happens to bird life on their farms so long as they have the advantage of a poison which kills the main crop pests simul-

taneously.

Several farmers who care for the wild birds on their farms have complained that some salesmen advised them to use double doses of monocrotophos on their crops but did not point out that this is against Government regulations and that other species besides quelea would be poisoned.

Approached for comment, Mr Thomson said he had on record dozens of cases of farmers who have contacted him to say that entire flocks of guinea fowl and ducks have suddenly died on their farms.

"They tell me they have no idea what has killed the birds, and when we go out and investigate it is almost invariably monocrotophos that is responsible.

"Many of these farmers said they had no idea what harm they were doing and that they had been encouraged to do so by salesmen.

"Some of these farmers build dams especially to encourage water fowl to come to their farms. One such farmer has found at least 1000 dead ducks in the last few months on his dam not far from Salisbury.

"Other farmers phone me and say they haven't a single guinea fowl left on their farms whereas

last year they had flocks of the birds.

"It is impossible to say more or less how many birds are dying as a result of monocrotophos poisoning, but the deaths that are reported to us must only be a tiny fraction of the damage this chemical causes."

Mr Thomson said farmers can make an immense contribution to the preservation of bird life by co-operating with his department, which undertakes to kill quelea where they are found in large enough flocks.

ROOST

"Not one farmer has complied with our proposed method of dealing with quelea," he said. "A farmer has only to build a bait roost to the windward of his croplands, where the quelea will naturally roost once they arrive at croplands."

Permanent bait roosts can be established by planting rows of wattles next to croplands. When the wattles are killed by cutting off the bark they are ideal roosts for quelea, Mr Thomson said.

"And when they are in the bait roosts in their millions we go at night and spray them with a substance that breaks down and becomes harmless four hours after the quelea have been killed."

Spokesmen for two of the main companies who supply monocrotophos to farmers, questioned about the product and its misuse, both claimed their salesmen did not give unethical advice to customers.

They said they observed Government regulations, which state that monocrotophos may be used for specific purposes only, mainly to kill aphids.

One spokesman said: "Once monocrotophos is sold to a farmer he can do with it what he likes and we can do nothing about it."

A spokesman for the Pesticide Registration Office in Salisbury said: "We are not aware that it is being used to kill quelea. There is nothing we can do about it.

"But there is forthcoming legislation, under the Hazardous Substances Act, which will make people who use such products for any but their specified purposes liable to prosecution."

The establishment of bait roosts on grain farms "will pay farmers hands down," Mr Thomson said. "Representatives of the Ministry of Agriculture and the Natural Resources Board have for years been begging farmers to establish these roosts, but the farmers plead poverty."

MISUSE OF PESTICIDE HIT

Salisbury THE HERALD in English 28 Oct 78 p 6

[Editorial]

[Text]

THE REPORT this week that thousands of guinea-fowl, water-fowl and birds of prey have been killed as a result of the misuse of an anti-aphid chemical by grain farmers made shocking reading.

The comment by an official of the Department of National Parks and Wild Life Management that many farmers could not care less about the threat to bird life makes one wonder where these people have been during the years that the world has woken up to its responsibilities to preserve the ecological balance as far as possible.

It is difficult to imagine that in this day there are still people who otherwise appear to be sane and sensible but who do not appreciate the dangers of misusing chemical killers.

More power to the Department if it can get the farmers to co-operate in controlling quelea the responsible way.

CSO: 5000

REPRESENTATIVE COMMENTS ON SEA POLLUTION CONFERENCE

Victoria NATION in English 26 Sep 78 p 2

[Text] Pollution was an important subject for discussion at the United Nations Law of the Sea Conference which ended in New York a week ago.

Mr. Aubrey Harris, the fisheries officer, who represented Seychelles, said that the discussions were not centred around one aspect of sea pollution, but dealt with the subject generally.

The next conference, to be held in Geneva next year, is expected to adopt an international law which all countries must obey.

"Everybody is getting impatient," he said, "and saying that it is high time the discussions came to an end.

"Coastal states are interested in protecting their coastlines and environment and were against the idea of oil tankers emptying their roughage in the ocean.

"Any tanker which is inside your 200 miles exclusive economic zone you have control over, and you can take the boat into custody if it is doing something to pollute the environment," said Mr. Harris.

"Every country has enough legislation to protect its environment from pollution, but in the case of tankers you must be equipped with the proper facilities to do so."

He said the patrol boat and plane which Seychelles would receive in the near future would help a great deal to protect our seas from pollution.

"Another main topic of discussion was that of countries emptying their garbage into the sea," he said.

"Countries not wishing to pollute their own waters dump their rubbish near the limit of their zone, so that the current will take it into the neighbouring country's zone, polluting the water there.

"This is a very bad practice and before doing so each country must think of its neighbour countries. If something is not good for you, it is not good for your neighbour."

Mr. Harris warned that an added danger to Seychelles waters could follow any discovery of oil.

"There is always a danger of oil pollution, such as happened in the North Atlantic and Mexico," he said.

"It is perhaps too early to talk about it, but if Seychelles happens to find oil in great quantities beneath its waters, care must be taken to prevent pollution."

CSO: 5000

NOISE POLLUTION: NORMS, RESEARCH

Moscow LITERATURNAYA GAZETA in Russian 3 Sept 78 p 13

[Letter from readers and commentary by specialists: "What Should the Law on Noise Pollution Be Like?"]

[Text] Issue No. 5 of LITERATURNAYA GAZETA for 1978 contained an article by L. Velikanova titled "A Law on Noise is Needed!". The editors received an official response to this article from G. Golubov, member of the board of the USSR Ministry of Justice. The draft Law of the USSR On Protection of the Air, which is now being developed, the reply states, also contains standards aimed at combating production, domestic and other noises. This report published in LITERATURNAYA GAZETA (No. 22, 1978) evoked a new outpouring of letters.

How will these standards be formulated in the law? What measures of liability for creating noise will they place into effect? We conclude our discussion of legal responsibility for maintaining quiet in the home by publishing letters from readers and commentary by specialists.

"Let them enjoy themselves..."

"Dear Editors: The buildings of a motor-vehicle plant's dormitory are located next to our home. And we have no peace, neither during the day nor at night. The dormitory residents have no respect whatsoever for those around them: loud music is played from early morning to late at night. Powerful amplifiers stand on the windowsills... We have called the dormitory many times at night, only to be told: 'There is nothing wrong with that. Let them enjoy themselves...'"

A clipping from the magazine ZDOROV'YE was attached to the letter, which was sent to the editors by residents of building No. 16 located on Yeniseyskaya street in Minsk. The clipping contained a drawing: a dead rat. It was the illustration for an article titled "Noise — A Killer."

"As part of a study of the influence of noise on organism," the article states, "test rats were placed in a basement in a laboratory in Buenos Aires, in which loudspeakers were turned on constantly. A few minutes later the rats began to show symptoms of paralysis, and they died six hours later."

"British medical experts have calculated that one out of every four men and one out of every three women in great Britain suffers neuroses resulting from noise."

"Deformities and abnormalities are encountered far more frequently in newborn babies born to mothers living near the landing pattern at the Los Angeles International Airport than in others," — a study conducted by The University of California concludes.

"It is the opinion of French medical experts that one out of five patients in a psychiatric hospital has lost his mind because of noise."

"The world's progressive scientists maintain that noise in the large cities reduces the individual's life by 8 to 12 years."

Readers who have sent the editors clippings from newspapers and magazines and quotations from books containing such reports inquire as to why the campaign against noise, which, according to scientific information, is so harmful, frequently receives no support or assistance.

"Dear Editors; it is inconceivable that industrial enterprises would be built in the center of a city, only 30 meters from apartment buildings, today. Make no haste to reply, because in Smolensk in 1974, that is, during the period when various decisions were being made on improving the environment, such an enterprise was built and placed into operation 30 meters from the windows of our building. It has all the attributes of an enterprise — a double-shift operation, machining areas, grinding and galvanizing shops, and warehouse facilities. The enterprise is located not only next to apartment buildings, but also near a school and a children's hospital.

"The city sanitary and epidemiological station is not in a position to resolve the issue of removing the plant from the center of the city... — K. Mitenkov, Smolensk."

"The noise made by a factory which produces wooden housing for television sets proclaims its presence over the entire territory of an adjacent settlement. I have called the director's office to complain and received the following: 'We are authorized to make any sort of noise up to 2300 hours. If you don't like that, move to another apartment. — B. Val'kov, Gor'kiy."

Citing these and many, many other instances and examples attesting to the fact that we cannot cope with creators of noise without a special noise-pollution law, the readers inquire as to what such a law should be like, what standards should be included in it, who should be vested with authority and for what, and submit their own proposals.

"I feel that LITERATURNAYA GAZETA has initiated a matter of state importance since it is aimed at protecting the people's health. Just why is the main blast of criticism directed against the planners, however? I am a construction engineer by profession, and I know that the planners are doing everything according to established standards and that each plan always contains the notation signed by the official responsible: 'Compiled in complete accordance with existing standards and regulations'." Just what are they to blame for? The law should be applied not to them but to those who live in their apartments by the principle "I can do anything I want to"— B. Val'kov."

"In response to our complaints we are told that the enterprise which has deprived us of sleep and rest was built according to current standards and that the distance between it and our home also conforms to the standard. What sort of standards are these, however, if the noise and rumbling from a production unit located nearby prevents us from opening the windows in our home? — asks Leningrad resident Ye. Mikhaylova. "This means that those who develop and approve such standards should be fined and punished."

"USSR Gosstroy should adopt noise-level standards which would make it possible for me to hear not only the beating of my watch but also the voice of the announcer on my television set and the footsteps of my children," — her feelings are echoed by Moscow resident K. Bekker.

By the Builders

A LITERATURNAYA GAZETA correspondent decided to turn to the specialists to determine what can realistically be done today to make our homes quieter. Following are some of their opinions.

A. V. Beruchyan, chief of the section for standard and experimental designing of residential buildings for Gosgrazhdanstroy's Housing Construction Administration: "Noise protection can be provided by increasing the bulk of walls and ceilings and with shock-absorbing strips. The partitions between apartments and the ceilings were 12 cm thick in the first monolithic apartment buildings built in 1958. This was gradually increased to 16 cm, first in one place and then another, and this was specified in the standards and regulations of 1971. These plans will be used in only 40 percent of the nation's new buildings even by 1980, however..."

A.A. Klimukhin, head of the laboratory for sound-insulation of buildings of the Scientific Research Institute for Constructional Physics: "We are now at the level of CEMA nations and the advanced nations in the West with respect to soundproofing of walls, partitions and ceilings. Soundproofing is greatly affected by the quality of the work, however. If a building plan calls for double partitions, for example, then there should be no contact between the two. In order to move back and forth more conveniently, however, the builders knock holes entirely through the partitions and then block them off with bricks and cover them with wallpaper. Such a wall becomes a sound-conducting instead of a sound-absorbing element."

Or take the following example. The hollow blocks of ceilings should be filled in with sand or slag, a cement securing device should be built, and pergamyn must be placed between them in order to prevent noise from entering "from the ceiling." Otherwise, the cement trickles through into the sand, and the entire structure becomes monolithic. It becomes a sound-conducting element. The builders frequently "forget" the pergamyn. A child drops a block in the apartment above, and an adult in the apartment below feels as though he has been hit in the head with a hammer.

In another instance the designers include a single hole running through the wall for socket outlets in two different apartments. The builders are supposed to place insulation cork between them. They are supposed to, but they do not. As a result the neighbor's clock cuckoos as though it were in ones own apartment...

Is it possible to force the builders accurately to perform those operations which cannot be seen with the naked eye?

In principle the specialists believe that this is not within the client's capability (as one of them expressed it, "The client cannot stand and observe the installation of each partition, each ceiling"). On the other hand, however, it is easy to find the client's signature indicating that everything has been checked and all of the operations performed at the bottom of any certification of such so-called unexposed work (that is, that work which cannot be seen with the naked eye).

"This should not surprise you," the specialists told the correspondent. "The signatures mean nothing. They are placed on the paper in a 'rubber stamp' manner. And what is the use of even looking at them if all of the responsibility for hidden defects, subsequently revealed, is not borne by them but by the renters of apartments on the two sides of sound-conducting ceilings, partitions and electrical outlets.

In short, we have no control over the quality of future sound-proofing of a home today. We therefore submit the following proposal for consideration by legislative agencies: it should be mandatory that special instruments be used when apartment buildings are accepted to determine the conformity of the apartments' sound-proofing to established health standards.

Noise gauges are already being used for the acceptance of housing, but only for measuring the sounds produced by elevators. Why not those produced by apartments? It would naturally not be necessary to check a radio or television with a sound gauge in each apartment, but only on a selective basis. The builders should understand that they will be fined for producing sound-conducting ceilings. If the members of the acceptance commission sympathize and sign the documents, then they will also be fined. It is an interesting fact that the editors receive very few complaints about noise from elevators. All state acceptance commissions should adopt the practice of checking the condition of sound-proofing in apartment buildings.

With Windows Opening Onto the Street

"I live on ulitsa Kuybysheva in Donetsk, in apartment building No. 36. The section of our street between Leninskiy prospekt and ulitsa Kirova carries such heavy traffic that there is no escape from it. Cars, trolleys, buses and trucks move in a continuous stream on both sides of the street. The terrible noise and rumbling goes on day and night. The apartment buildings are located almost adjacent to the carriageway of the street. We cannot think of opening the shutters, let alone the balcony doors: if we do it becomes impossible to talk in the apartment — we cannot hear each other. We cannot even hear a television set operating at full volume. It is impossible to put up with this noisy hell. — A. Minkin, Donetsk."

When one reads the letters from people living on the main transport arteries (the specialists call them "transport sewers") one begins to think that all of the other martyrs were not martyrs at all: imagine a neighbor turning on a transistor radio to its full power! He finally leaves or goes to sleep. There is no respite from the traffic noises.

B. G. Prutkov, head of the laboratory for urban development acoustics of the Scientific Research Institute of Industrial Structures under USSR Gosstroy: "An average of nearly 2,000 vehicles per hour pass over the large traffic arteries, creating a noise level of 75 to 85 decibels."

G.L. Osipov, head of the laboratory for combating industrial and city noises of USSR Gosstroy's Scientific Research Institute of Constructional Physics: "The traffic noise level increases annually by 0.5-1 decibel."

How can the transport channels be protected against noise?

There are several ways. One of them is to set up high-speed roads, which would remove traffic from the main city streets. If only 500 vehicles per hour passed over such a street instead of 2,000 the noise level would drop to 70 decibels. Ten thousand to 15,000 vehicles per hour might travel on the high-speed road, however, and the noise level there would reach almost 90 decibels. Special protective embankments and walls should be built there. Such a wall has been built from the Orly airport to Paris, for example. It

is 8 meters high. Other high-speed arteries should obviously be placed in tunnels. The campaign against noise is not an inexpensive one.

V. M. Kuznetsov, chief specialist for Gosgrazhdanstroy's Housing Construction Administration: "It is very good to build so-called noiseproof houses near main transport lines."

B.G. Prutkov: "An experimental noiseproof apartment building is under construction in Moscow's Otradnoye microrayon. Novosibirsk architect Okolichnikov is one of the initiators of the construction of such housing in our nation. The foundation has been laid. MNIITEP has already developed two or three standard designs for noiseproof apartment buildings. The old apartment buildings can also be converted into quiet ones, but they must be altered completely."

In a noiseproof apartment building the windows of auxiliary premises such as kitchens, bathrooms, staircases and, in extreme cases, those of a single room of a 3-room apartment, face the main thoroughfare. There are experimental apartment buildings with triple glazing (one such building has been built on Gor'kiy street in Moscow, for example). The specialists consider separate frames to be far more effective, however.

The readers ask why apartment buildings are not already being built with the ends toward the street and why shrubbery is so infrequently used for protection against noise. This is what the specialists say. The traffic noise level drops by 20 decibels when a building is located 200 meters from a road. It is reduced by 16 decibels at 100 meters, 12 decibels at 50 meters, and only 6 decibels at 20 meters. When the end of the building is next to the road the noise level in the apartments is reduced by an average of only 3 decibels. Planting shrubbery is very good, but this has to be special plantings, which are lacking almost entirely in the cities. They should be coniferous and so dense that "even a cat could not penetrate them." They are effective barriers to sound in this case.

It is the common opinion of the specialists that there is no panacea against traffic noise and that individual measures produce little: it is important to use each of them efficiently, as well as together, as a system.

The readers' point of view with respect to the development of legal standards is the following: it is essential to define the measure of responsibility for planning when main traffic arteries are built. There should be no situation in which there is no relief from the noise in an apartment and no one to hold accountable.

Cars, buses, trolleybuses, street-cars and aircraft should be made as quiet as possible.

Ye. I. Kutarev, chief architect for the Central Scientific Research Institute of Industrial Structures for Urban Development: "We must combat not just the effects, but also the sources of the noise themselves — rumbling motors."

What Is Possible and What Is Not

We receive many letters, the leitmotiv of which is approximately the following: you write a great deal about future construction. What are the residents of the "non-noiseproof" houses built in 1958 to do, however?

"Around 2300 hours," writes Moscow resident M. Bobrov, "the television announcers caution us: 'please turn your television sets down. It is late...'. Does this mean that during the rest of the day an individual can adjust the volume any way he sees fit? The television set's comrade, the radio, is a different matter entirely. Radio announcers demand that a radio or loudspeaker be adjusted so that its noise does not go outside the room in which the unit is located. Regardless of the time of day! And this is absolutely proper. We can only propose that the radio and television announcements on noise be unified."

Reader Maksimenko from Krivoy Rog proposes that the sale of sound-proofing materials to the population be started immediately, and Moscow resident Petrova considers it necessary to add a new service, "sound-proofing of apartments," in the repair offices, also on an emergency basis.

It is the opinion of the specialists that none of these proposals are very realistic, or, more accurately, are very unrealistic.

A.A. Klimukhin: "It would be difficult to provide such a service because one individual could be willing to do anything to sound-proof his apartment, while another, precisely that individual making the noise, would not be willing to at all. Noise from below does not bother him, and he has no inclination to dismantle his floor for the sake of a neighbor. Others build suspended ceilings for themselves, lathe or insulate with mineral wool, but all of this is of little benefit. It is very difficult to 'treat' sound-proofing."

B. M. Kuznetsov: "Capital repair or reconstruction is necessary to take steps against noise in these relatively old buildings. In the meantime, considering the fact that the noises mainly penetrate through the ceilings, the floor should be covered with beaver-cloth padding, or rugs and runners should be laid down. And, naturally, the rules for communal living should be observed."

A great deal is written about the rules for communal living. "It is my apartment, and I do whatever I want to there."; "Don't bother me. From 7:00 in the morning till 11:00 at night I am free to make as much noise as my heart desires." — these are typical responses to attempts to control those who like loud music, drunken revelers and those engaged in construction work, handicrafts, repair work and so forth, at home.

The law should define what may or may not be done in a non-soundproof apartment, between 7:00 o'clock in the morning until 11:00 at night, as well as at any other time of the day. There should be clearly defined measures of responsibility for violations.

B.G. Prutkov: "Like any other serious foe, noise demands respect. We are beginning a major offensive against noise, which means that as in any war we also need a general staff and troops. We now have neither. It is essential to create an extradepartmental agency, a Noise-Protection Center, for example, which would help to work out a noise law and would then assume the function of monitoring its observance."

We attached no special significance to noise for a fairly long time: we preferred to ignore it against the background of the overall successes being achieved in the scientific and technological revolution. When it became impossible "to ignore" the effect of the howling and the din, and their destructive effect on everything living, the specialists came up with the term "noise pollution of the environment." We should not delay the development of strategy and tactics for combating this pollution. It is important to think over carefully each version of the law on noise, which is designed to put an end to the decibel offensive against man's health.

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BRIEFS

FIRE PATROL—Gor'kiy—Planes and helicopters from the Gor'kiy division of the Western Urals Forest Protection Air Base take off each morning from the airfield. Things have been quiet with respect to fires in Central Russia this summer, but they have occurred in other places. Parachutists and airborne troops from the Gor'kiy division have helped to extinguish a fire in the forests of Krasnoyarskiy Kray, and they are now in Tyumenskaya Oblast. Quite recently an airborne forest patrol group returned from Afghanistan. Young V. Shoshin, P. Gushchin and M. Kondrachenko received expressions of gratitude for their excellent work from the government of that friendly nation. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 8 Aug 78 p 4] 11499

EARTHQUAKE IN GEORGIA—An underground tremor with a force of 3 to 4 on the Richter scale was felt in Tbilisi on 23 August at 0148 hours Moscow time. The earthquake's epicenter was 58 km from the capital of the republic, near the city of Gori. The underground tremor reached a force of 5 to 6 on the Richter scale there. The earthquake caused no serious damage. [Text] [Moscow PRAVDA in Russian 24 Aug 78 p 6] 11499

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NORWAY

ENVIRONMENT MINISTER COMMENTS ON TALKS IN USSR

LD021343Y Oslo AFTENPOSTEN in Norwegian 28 Sep p 52 LD

[Kjell Dragnes interview with Norwegian Environment Minister Brundtland: "Brundtland Received Soviet Support Against Acid Rain"]

[Text] Moscow, 27 September--"The most important feature of this visit is that we have received Soviet support for working toward a convention against permitting the drift of air pollutants across national boundaries," Environment Minister Gro Harlem Brundtland said Wednesday on the conclusion of her official visit to the Soviet Union.

The Soviet Union endorses the fundamental principles of the environment convention drafted by the Scandinavian countries after the meeting of their environment ministers last fall. The Soviet side will now carry out further work on the details in this proposal and there will be contact between Norwegian and Soviet officials and experts on these questions.

"We have made it understood that the growing discharge of sulfur dioxide and the long term damage that can be inflicted on nature by sulfurous contamination are also viewed here with great concern," Minister Brundtland said. She gained the impression that, in many ways, the Russians are fighting the same problems as both the United States and Norway and are coming up against different central and local interests.

"The Leningrad Central Geophysical Laboratory, which is conducting extensive research into environmental questions, has a considerable knowledge of the long term problems entailed in the discharge of sulfur. [paragraph continues]

"But it is clear that it costs more to clean more, and that those who must bear the cost in the short term are less enthusiastic," she said.

[Question] The party organ PRAVDA wrote earlier this week that the discharge of sulfur from the nickel mines at Nikkel near the border with Norway has led to extensive parching of reindeer pastures, for instance. Was this raised during the visit?

[Answer] No, this was not mentioned directly. However, we know that the Soviet side is carrying out cleaning measures in that area, although we still do not know to what extent. This is a problem to be discussed later on the basis of what we have discussed here. We are closely following this case.

According to AFTENPOSTEN's information, Norwegian experts calculate that the enrichment of nickel ore at Nikkel leads to a greater discharge of sulfur than from Norwegian industry as a whole.

Gro Harlem Brundtland also had occasion to discuss an extension of the agreement on protecting polar bears. The agreement was signed in 1973 by Norway, Denmark, the United States, Canada and the Soviet Union. It expires in 1981. The Russians also reacted positively here, and there is a good chance that the agreement will also be widened to include other species in the polar regions, the environment minister thought.

The delegation visited Leningrad and Kiev as well as Moscow during its visit to the Soviet Union. The Russians showed its members a nature preserve, a cleaning installation, a combined heat and electricity generating station, and other sites.

The Soviets were also particularly interested in Norway's experience in maritime oil drilling and the consequences of last year's Bravo accident. That was given much attention in the Soviet mass media.

"Obviously there was uncertainty as to whether our policy was really unchanged after the Bravo accident," the environment minister said.

The visit to the Soviet Union was hosted by the State Committee for Sciences and Technology, which is a coordinating organ for environmental protection in the Soviet Union. Representatives of the committee have been invited to Norway.

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WEST GERMANY

BAVARIAN FOREST PARK POINTS UP ECOLOGICAL PROBLEMS

Cologne RHEINISCHER MERKUR in German 6 Oct 78 p 16

[Article by Willy Luetzenkirchen: "Disrupted Mountain Wilderness in the Bavarian Forest"]

[Text] In order to prevent ruinous exploitation and insure an ecological balance of flora and fauna, ministries and forestry offices, in their effort to preserve the countryside, aim at restoring the original biotopes in the forest, but as a result of economic interests this work is beset with problems.

The wilderness between Teufelsloch and Rachelsee is like an ecological fairyland. Moors and mountain streams run through the wooded landscape, interspersed with valleys and gorges, granite rocks and boulders, ponds and marshes. Deep in the mountainous woods there live the last lynxes in Germany. In the riverside thicket in some valleys, one can find the underground passages of a river otter. Neither of these animals exists in any quantity in central Europe any more. A lot of the plantlife is almost exotic--carlinae, orchids, quaking grass and sedge, hawkweed and peat moss.

This piece of nature is the Bavarian Forest National Park, so far the only national park in the Federal Republic, an ecologically still intact forest landscape of eastern Bavaria, on the border of Czechoslovakia. All the original elements of the environment are still there and are functioning. This includes not only flora and fauna but the local climate, the soil and the bodies of water.

"Intensive Timber Industry"

So far the Bavarian Forest National Park has been considered a model of German protection of nature and countryside, intended to set standards and serve as a model for the concept and layout of other national parks in the Federal Republic and elsewhere in Europe. This now appears open to question, because it has become the subject of violent controversy

among scientists, environmentalists, municipalities, land developers and politicians. The project of the Bavarian Forest, previously acknowledged as a pioneer achievement in the protection of the environment, is getting into the crossfire of strong criticism. In light of the plans and proposals for establishing other national parks in the German Alps, the Rhoen, the Lueneburg Heath and the North Frisian Tideland, this controversy may be considered to be of fundamental importance. For ecologists and experts on environmental protection, the Bavarian Forest National Park, which was opened 7 years ago, is becoming the subject of research and an object lesson.

The beginnings of criticism include an expert assessment by the Federal Research Institute for Protection of the Environment and Ecology which expresses misgivings about the fact that "intensive timber industry" continues to be conducted. There is an excessive number of public roads in the area and no restriction of visitors as to area and number, leading to the encroachment of natural development.

There continues to be a lack of primarily environmentalist planning, people at the institute say. A demand should be made for giving the national park a status of complete nature preserve, which would make it possible to realize the set objectives.

They say it is awful that the forest is still being exploited commercially and that this constitutes a violation of the Bavarian nature preserve law. The liabilities caused by lumbering, hunting, tourism and excessive roadbuilding at the approaches to the national park are making it appear a "negative example." This is the way the League for the Protection of the Environment has it. According to it, it looks like the national park is not leading to a protection of the environment but is to make possible better utilization and marketing of nature.

Prof Richard Plochmann of Munich University states: "If the Bavarian Forest National Park is to be more than an old forest in Bavaria, the key question in the case of a forest national park above all else becomes the utilization of timber. Because this question is of central importance for the future, the national park is now at a crossroads. It will not be possible to avoid the decision to stop lumbering as long as one sincerely wants to refer to the Bavarian Forest as a national park."

This is what the chairman of the Committee for the Environment in the Bavarian Landtag, Alois Glueck, has to say: "As far as protection of the environment is concerned, the national park can easily become a trap. An area so identified, and so well known, doubtless can easily be very much overtaxed and endangered by the stream of visitors. It would be better not to plan any more national parks in the foreseeable future."

If, on the other hand, one visits the Bavarian Ministry of Agriculture in Ludwigstrasse in Munich to find out details about how this national park is faring, one must admit that the importance of the park is not

being underrated and that the financial and personnel provisions must be regarded as generous. So far DM 25 million have been expended, from land and federal funds. The personnel includes 180 officials and employees. For scientific work, too, the national park offers ideal prerequisites: 40 research projects have been started or concluded. They include investigations in ecology, wildlife biology, zoology, soil research, geology, meteorology, hydrology, botany and behaviorist science.

The Fate of the National Park

Here, too, there are problems--concerns resulting from the conflict between protection of the environment and leisure pursuits. More than 1.2 million people--four times as many as in 1971--visit the national park over a period of a year. This stream of visitors is being promoted by a tourism infrastructure in the national park and in the approaches which is likely to be infringing on the environmental aims of the project. There are about 230 kilometers of trails through the national park, which in addition is traversed by 280 kilometers of forestry roads and paths. The area taken up by parking has more than tripled during this period. Then there are 30 rest areas, 24 shelters, as well as playgrounds and barbecue areas. A total of 25 animal species are kept in enclosures and aviaries. Thus there is a concentration of tourist attractions on the 130 square kilometers of the national park.

What changes have occurred in this countryside since the national park was established? How have the five biotopes, the natural common habitats, developed--the woods of spruce in the valleys, the mountainous mixed woods at an altitude of 800 to 1,200 meters, the mountainous woods of spruce above them, the high moors and the valleys with streams?

Fringe Position and Inclement Climate

There are only two settlements with a few hundred inhabitants in the national park. Except for lumbering, which did not achieve any particular importance until the 19th century, a fringe position and an inclement climate have prevented economic development. This part of the Bavarian Forest was settled first in the 13th century, but clearing of land and the establishment of villages occurred after 1500. For centuries the area remained a land of lumberjacks, charcoal burners and glassblowers, of sawmills and papermills, a wooded area inhabited by wolves and bears as late as the 19th century.

In the past 120 years lumbering has changed the forest in a lasting manner. Old mixed woods, including remnants of virgin forest, partly more than 300 years old, now only constitute 5 percent of the national park area. Spruce takes up more than 60 percent, pine 5 percent, fir 4 percent, beech 20 percent. Wherever water cannot flow off fairly quickly, lowland and swampland develops, taking up 20 percent of the area. Moors with peat up to 10 meters are devoid of trees; elsewhere there grows swamp birch, low pine, fern, shrubs, moss and grasses. At the heights there

are only woods of spruce, including highly varied types of forest depending on the soil, microclimate and altitude. Despite the fact that there has been intensive large-scale lumbering in the past 120 years, the area to a large extent has retained a natural wood character. During the last century the logs were floated into the valleys over dammed-up streams. This drafting system was followed by the log railroad, whose place then was taken by truck transport.

Though, according to the Bavarian nature preserve law, national parks are primarily intended for the preservation and scientific observation of common natural and near-natural habitats as well as for maintaining wildlife and plantlife of the greatest possible variety--and not for any commercial exploitation--and though they were to be opened up to the population for educational and leisure purposes insofar as the purpose of preservation permitted, this objective is still quite remote. Of a total area of 13,000 hectares only 4,000 hectares are free of timber utilization. Less than one-third of the woods is free of human inference. Only about 920 hectares are subject to conservation, with any change being prohibited. In the opinion of Professor Plochmann, this state of affairs is "irreconcilable with the idea of enabling natural processes to occur without disruption."

As far as Prof Wolfgang Haber of the Institute for Ecology of the Technical College in Munich is concerned, the utilization of timber, contrary to what is being claimed at the Bavarian Ministry of Agriculture, is not proceeding according to ecological points of view, which would permit existing mixed woods to be spared to a large extent. Haber says that what needs to be done is to gradually restructure the woods in order to restore the original biotopes which existed before the start of lumbering. The growing and dying of trees is to be left to the interplay of nature. The forest is capable of adapting to the overall ecological conditions, reverting to the original vegetation. This definitely requires forestry intervention, in a transitory phase, creating more favorable conditions for this reverting process. Without measures intended to achieve a definite aim--such as the change in the proportion of types of trees--the natural structure of the mountainous mixed woods cannot be restored. While the amount of spruce is not to be reduced, the proportion of silver fir or deciduous trees must be increased. The virgin forest remnants in the Rachelsee area in the north of the national park constitute a model for this development. Here the common natural habitats of the original forest can develop without disruption. A forest satisfying the needs of the timber industry then becomes a wild forest again. These demands run counter to the economic demands of the surrounding area. A sudden cessation of utilization of timber would threaten the wood-processing industry, its jobs and the economies of the municipalities in this region, which is structurally weak. The timber industry yield, after all, amounts to more than DM 20 million a year.

Regulation of Wildlife

Meanwhile it has been possible to begin or complete two tasks which are important for making the woods ecologically sound--the regulation of wildlife and the reintroduction of original animal species. Roe deer and deer have been able to increase strongly in the past decades. Much hunted and pursued in the German forests, predators can see to the old ecological order in the national park. As also in the other forests of the Federal Republic, the relationship between predator and prey is extremely unfavorable. As a result of a far-reaching lack of predators, the density of population of game increases, leading to a damaging of the forests. Lynx, fox, birds of prey and also marten, ermine and river otter are needed for maintaining a balance.

Three birds of prey have been newly settled in the national park--the eagle owl, hawk owl and raven. The buzzard, goshawk and sparrow hawk also play an important part in this strategy. Zoological rarities include the capercaillie, black grouse and hazel grouse, greenwing, ring ouzel as well as some species of owls and woodpeckers. In the opinion of Professor Haber and the Research Institute for Ecology, the following species should be reintroduced into the national park: Beaver, wolf, black stork and the lesser spotted eagle.

Warning by the Ecologists

The ecologists, however, warn against too optimistic expectations. Thus even the experts of the Ministry of Agriculture in Munich doubt whether it will be possible to save the last south German river otters in the national park. The species of the lynx, indigenous again in eastern Bavaria only since 1970, is also in danger; probably only about 8 to 10 grown lynxes now exist in the Bavarian Forest. The situation of the capercaillie, black grouse and hazel grouse, which might die out without stronger measures of protection, is also precarious. These react particularly sensitively to the increase in visitors' throngs and exploitation of timber. Thus valuable mating and breeding places are lost. These grouse species, Wolfgang Scherzinger of the National Park Office explains, have a chance of survival only if the woods are regenerated on a large scale and there is stricter control of visitors. The small area of the national park and the great losses in biotopes in the surrounding area, plus the inclement climate and the small biological productivity of the forest, do not provide a sure base for saving these species.

The Alps National Park--the next national park to be created--extends over more than 20,000 hectares. It comprises the fringe of the Alps south of Berchtesgaden, in the area of the Koenigsee. Its natural assets include mountainous mixed woods, woods of spruce, the 510-hectare lake and willows and meadows. The Tideland National Park on the North Sea coast of Schleswig-Holstein would extend over about 165,000 hectares. It would include islands, islets, geest and dune areas and areas of sand and tideland. Here birds and seals are the focal point of measures of

protection. A large national park might be created in the east of the Rhoen, comprising woods of deciduous trees, meadows and moors. The area is not inhabited. More problematic would be a national park in the Lueneburg Heath, between Soltau and Harburg; the present nature preserve comprises not quite 20,000 hectares and consists of moorland and coniferous woods.

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